REMARKS

Claims 1-7 and 9-13 are pending in the application with claims 1-7, 9 and 10 under active consideration. Claim 8 was previously cancelled.

The office rejected claims 1-7, 9 and 10 under 35 U.S.C. § 103(a) over van der Slot (Organometallics, 2002, 21, 3873-3883) and Billig (Kirk-Othmer Enclyclopedia of Chemical Technology, 1996, "oxo process" pages 1-17).

In the reply filed December 3, 2008 in response to the final office action mailed October 3, 2008, applicants noted that the combination of the claimed bidentate ligands and monodentate ligands gave unexpected results compared to the cited references. In the advisory action mailed January 13, 2009, the office noted that the comparative examples given in the specification were for catalyst compositions containing only monodentate ligands or only biodentate ligands. The office concluded that:

> "One of ordinary skill in the art would be invited to try to combine a monodentate ligand such as TPP, which as stated by Billig is the gold standard in hydroformylation with the bidentate ligand of van der Slot et al. In making the combination, the person or ordinary skill would try out various ratios of TPP to bidentate ligand to check out which is the best ratio for hydroformulation. Therefore, applicant's claim of synergy is not necessarily unexpected since the various ratios of TPP to bidentate ligand would actually make different in situ catalysts that are like what is shown in Scheme 2 of van der Slot et al."

In response, applicants noted that the comparative examples given in the specification were commensurate in scope with the references (i.e. either a monodentate ligand or bidentate ligand). The office appears to be requiring unexpected results based on the applicants own disclosure (i.e. combining the two types of ligands). Applicants have demonstrated that superior or unexpected results are obtained with the claimed catalyst composition relative to the prior art. Applicants again direct the office to tables 1 and 2 in the specification that clearly show the claimed composition gives superior or unexpected results with regard to catalytic activity and selectively over prior art catalyst systems. Applicants reiterate that it is improper to use the

applicants own disclosure to establish the standard for superior or unexpected results (see *Graham v. John Deere Co. of Kansas City*, 383 US at 36, where the court cautions against "reading into the prior art the teaching of the invention in issue"). Applicants submit that a showing of superior or unexpected results were demonstrated relative to the cited references, and accordingly, this showing rebuts any *prima facie* case of obviousness (see MPEP 2145 (VII)).

In the office action mailed May 14, 2009, the office appears to maintain that the applicants have not provided evidence of unexpected results that rebut any *prima facie* case of obviousness. Applicants respectfully disagree. As noted above, previous responses and the specification have demonstrated unexpected results. In the May 14, 2009 office action, the office states that:

> "The applicant has traversed the rejection on the grounds that the Examiner has provided the motivation to combine the references from the instant specification, that van der Slot et al. did not use monodentate and bidentate ligands in combination, and that the combination yields superior or unexpected results, for which data is provided in the arguments.
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> The Examiner respectfully disagrees. Firstly, van der Slot et al. essentially teach using a monodentate ligand with a bidentate ligand in Scheme 2 on page 3876. van der Slot et al. go on to teach that compound 11, which has two bidentate ligands coordinated to the rhodium atom, is totally absent in hydroformylation conditions. Therefore, van der Slot et al. strongly suggest that a bidentate ligand in conjunction with a monodentate ligand can be used with the rhodium catalyst in order to perform the reaction. Billig et al. supplements van der Slot et al. by teaching that TPP with a rhodium catalyst is the industry standard for hydrofomylation (sic) of ethylene and propylene. If someone of ordinary skill in the art was going to use a monodentate ligand with a monodentate ligand as suggested by the teachings of van der Slot et al., they would turn to the monodentate ligand which is the industry standard.
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> As to the data presented in the arguments, it cannot be determined if the data presented was generated by the same methods of the instant specification as the data is not presented in declaration form. However, even if the data provided was in a declaration, the data presented only shows a snapshot of one ligand

system, and is not commensurate in scope with the breadth of the claims in the instant application."

The office's conclusion that van der Slot teaches a monodentate ligand with a bidentate ligand is factually incorrect. van der Slot uses bidentate ligands and it is irrelevant that the bidentate ligand may be coordinated at only one end of the ligand as an intermediate during a reaction. The fact that one end of the ligand may not be coordinated during the hydroformylation reaction to make room for the CO molecule does not change the fact that the ligand is a bidentate ligand. The catalyst composition as claimed contains both a mono-and bi-dentate ligand and the composition utilized in van der Slot contains only bidentate ligands. Applicants submit that the unexpected selectivity and catalytic activity arises, in part, due to the presence of both types of ligands. The unexpected results certainly were not predictable based on van der Slot as noted below.

In addition, even if it were assumed (which applicants do not concede) that scheme 2 of van der Slot suggests a monodentate ligand, the showing of superior or unexpected results still rebuts any *prima facie* case of obviousness raised by the office.

Further, applicants submit that the office's conclusion that a mono-coordinated bidentate ligand is the same as a monodentate ligand is incorrect. The chemical and sterical environment created by a bidentate ligand and a monodentate ligand is quite different. This is confirmed by van der Slot at page 3874, left column, lines 7-10. Here van der Slot states that:

"Bulky bidentate phosphite can give high selectivity in linear aldehydes but these catalysts are less active than bulky monophosphites."

van der Slot is clearly teaching away from monodentate ligands because of their low selectivity. This statement confirms that the unexpected results were not predictable. Applicants reiterate that they have discovered that both high selectivity and catalytic activity can be obtained by the claimed combination of the specific combination of the bidentate legend of formula 1 and the monodentate ligand of formula 2. Applicants note the claims are directed to specific mono- and bi-dentate ligands and not every type of ligand under the sun. It is this specific combination of ligands that applicants have unexpectedly discovered give both high selectivity and catalytic activity.

With regard to the data presented in the response filed January 12, 2009, applicants again present the data in the form of a Declaration and discuss the data given in the declaration below. With regard to the office's conclusion that the data is only a "snapshot" and is not commensurate

in scope with the claims, Applicants reiterate this data along with the data in the specification is most certainly commensurate in scope with the claims. In addition, the data in the declaration was presented to rebut the office's conclusion that one would necessarily obtain good results by combining a mono- and bi-dentate ligand. This data clearly shows that one would not necessary obtain good results by combining the two types of ligands. Applicants submit that to conclude one would obtain good results by combining both types of ligands, the result must necessarily be true. The following data clearly shows it is not necessarily true. The data given in the Declaration illustrate selectivity and activity data for three catalyst systems containing a bidentate (comparative example 4 using BPO-P(Pyl)$_2$), a monodentate ligand (comparative example 5 using EP) and both a monodentate and bidentate ligand (comparative example 6 using BPO-P(Pyl)$_2$ and EP).

The experimental parameters are given below and the results are summarized in table 3.

Comparative Example 4: Hydroformylation of propene using acetylacetonatodicarbonylrhodium (Rh(AcAc)(CO)$_2$) catalyst a and 1,1'-biphenyl-2,2'-diyl-bis(dipyrrolylphosphoramidite) (BPO-P(Pyl)$_2$)

The experiment for catalytic activity was performed in the same manner as in Example 1 given in the specification except that BPO-P(Pyl)$_2$ was used alone as a ligand and a molar ratio of ligand to rhodium was 3.

Comparative Example 5: Hydroformylation of propene using acetylacetonatodicarbonylrhodium (Rh(AcAc)(CO)$_2$) catalyst and eicosyl phobane (EP)

The experiment for catalytic activity was performed in the same manner as in Comparative Example 4 except that EP was used instead of BPO-P(Pyl)$_2$ as a ligand, and a molar ratio of ligand to rhodium was 3.

Comparative Example 6: Hydroformylation of propene using acetylacetonatodicarbonylrhodium (Rh(AcAc)(CO)$_2$) catalyst, 1,1'-biphenyl-2,2'-diyl-bis(dipyrrolylphosphoramidite) (BPO-P(Pyl)$_2$) and eicosyl phobane (EP)

The experiments for catalytic activity were performed in the same manner as in comparative Example 4 except that BPO-P(Pyl)$_2$ and EP was used instead of BPO-P(Pyl)$_2$ as a ligand, and molar ratio of ligand to rhodium was 3.

Table 3

	Catalyst	Ligand 1 (L1)	Ligand 2 (L2)	L1Rh Mol/mol	L2/Rh Mol/mol	N/I	Catalytic activity ($mol_{(BAL)}/mol_{(Rh)}/h$)
Comparative Example 4	$Rh(AcAc)(CO)_2$	BPO-$P(Pyl)_2$	-	3	-	13.9	149.8
Comparative Example 5	$Rh(AcAc)(CO)_2$	-	EP	-	3	1.35	136.8
Comparative Example 6	$Rh(AcAc)(CO)_2$	BPO-$P(Pyl)_2$	EP	3	3	16	8.5

As shown in Comparative Example 6 of Table 3, mixing a bidentate ligand (BPO-$P(Pyl)_2$) and a monodentate ligand (EP) decreases catalytic activity of catalyst composition in comparison with Comparative Examples 4 and 5 that use only a monodentate or a bidentate ligand. Thus, a mixing of a bidentate ligand (BPO-$P(Py1)_2$) and a monodentate ligand (EP) does not necessarily give an unexpected or superior result as suggest by the office. Therefore, the specifically claimed ligand compositions and specifically claimed concentrations would not have been obvious over the cited references since not all monodentate/bidentate catalyst systems give unexpected or superior results. Accordingly, the results are unexpected and applicants respectfully request that the office withdraw the rejection of claims 1-7, 9 and 10 under 35 U.S.C. § 103(a) over van der Slot and Billig.

Finally, applicants respectfully request that, if elected claims 1-7, 9 and 10 are found allowable, the office rejoin non-elected claims 11-13. Applicants note process claims 11-13 contain all the limitations of claim 1, and therefore, are eligible for rejoinder (MPEP § 821.04).

In light of the remarks above, applicants submit the application is in condition for allowance. Favorable reconsideration is respectfully requested.

If there are any charges due with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' attorneys.

Respectfully submitted,

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